SER. NO. 19/679,428
LUCIANO TOSATO

AN

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（A）**　(11)特許出願公開番号

特開平7－80064

(43)公開日　平成７年(1995)３月28日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ａ６１Ｍ　5/24 3/00				
			Ａ６１Ｍ　3/ 00	Ｚ

審査請求　未請求　請求項の数１　ＦＤ　（全 8 頁）

(21)出願番号　特願平5－181979

(22)出願日　平成５年(1993)６月28日

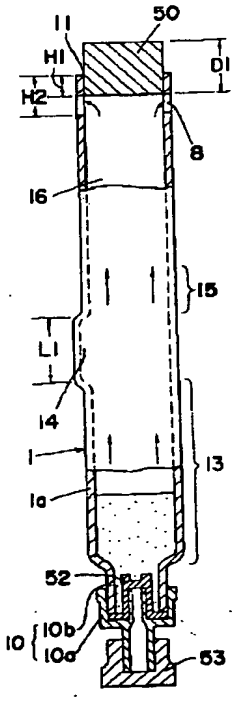
(71)出願人　000162261
共和真空技術株式会社
東京都港区西新橋２丁目８番18号　共立ビル
(72)発明者　小笠原　喜六
東京都港区西新橋２丁目８番18号（共立ビル）　共和真空技術株式会社内
(72)発明者　小林　正和
東京都港区西新橋２丁目８番18号（共立ビル）　共和真空技術株式会社内
(74)代理人　弁理士　新関　和郎

(54)【発明の名称】　薬品容器兼注射器における注射筒本体

(57)【要約】

【目的】　薬品容器兼注射器Ａにおいて、それの注射筒本体１内に乾燥薬品４を封栓する中間栓５０を、注射器としての使用の際に薬液を射出させるピストン頭部としての機能を損なわずに、注射筒本体１内に注入した薬液を乾燥薬品４に凍結乾燥させる間、注射筒本体１の上端の開口１１に半打栓状態として装着しておけるようにする。

【構成】　薬品容器兼注射器の注射筒本体の円筒部の筒壁の上端側の部位に、筒壁の一部に穿孔した通気孔を、１個ないし数個設け、かつ、その通気孔の下端から、円筒部の上端の開口の口縁までの上下距離を、中間栓の上下の厚さより短く設定する。



1

【特許請求の範囲】

【請求項１】　円筒部１ａの下端底部に注射針２の装着用のノズル部１０を設け、そのノズル部１０にはゴム材よりなる孔栓５２を装着し、その孔栓５２より上方の円筒部１ａに、下方から上方への順で、乾燥薬品４を収容さす乾燥薬品室１３と、筒壁の一部を拡径した通液バイパス１４と、中間栓５０を嵌挿する中間栓部１５と、溶解液６を収容さす溶解液室１６と、液室栓５１を嵌挿する液室栓部１７と、を形成した薬品容器兼注射器の注射筒本体１において、円筒部１ａの筒壁の上端側の部位に、筒壁の一部に穿孔した通気孔８を、１個ないし数個設け、かつ、その通気孔８の下端から、円筒部１ａの上端の開口１１の口縁までの上下距離Ｈ２を、中間栓５０の上下の厚さＤ１より短く設定することを特徴とする薬品容器兼注射器における注射筒本体。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、注射薬が注射器の注射筒本体内に予め封入されている形態とした薬品容器兼用注射器のうちで、注射筒本体内に封入しておく注射薬を、凍結乾燥させた薬剤とこれを溶解させる溶解液とに分離しておき、注射の施術の際に、注射筒本体の内部で薬剤を溶解液により溶解させて注射液とする形態の薬品容器兼用注射器における注射筒本体についての改良に関する。

【０００２】注射薬は、製造時に薬品小容器（アンプルまたはバイアル）に充填密封されて、出荷・流通し、使用時に、薬品容器から注射筒に薬液を吸引後、これを注射筒から患者等の体に注射する方式が伝統的で、今日も一般的である。しかし近年、注射薬を注射器の注射筒本体の内部に予め装填しておく、薬品容器兼注射器がプレフィル・シリンジ（pre-filled syringe）等の名称で使用されはじめた。薬品容器から注射器の注射筒本体への薬液の移転に伴う、誤用、誤操作、異物混入汚染や注射針刃先の損傷を防ぎ、かつ一刻を争う急患に対し、高粘性ないし揺変性薬液を注射筒へ吸引する手間と時間を省くためである。

【０００３】液状では不安定で、製造時に薬品用器内で凍結乾燥され、この乾燥薬品容器とは別容器の溶解液添付で流通している用時溶解凍結乾燥注射剤は、生物工学の急速な進歩とともに、癌治療薬等として重要性が一層高まっているが、使用時の手順は液状注射剤より一層複雑である。即ち、溶解液を溶解液容器から注射器の注射筒本体内に吸引後、その注射筒本体から乾燥薬品容器内に射出して、乾燥薬品を溶解し、溶解後の薬液を、当該注射筒本体内に再吸引して、体内に注射しなければならない。かかる用時溶解注射薬の場合にこそ、薬品容器兼注射器の普及が期待される。この発明は、凍結乾燥注射剤のための薬品容器兼注射器を改良し、その普及をはかるものである。

2

【０００４】

【従来の技術】従来の凍結乾燥注射剤用の薬品容器兼注射器Ａは、円筒部１ａの下端底部に注射針装着用のニップル状のノズル部１０を設けた注射筒本体１と、それのノズル部１０に装着される両頭針の注射針２と、注射筒本体１の上端の開口１１から嵌挿するプランジャー３と、注射筒本体１の円筒部１ａ内に装入せる乾燥薬品４を封栓するよう円筒部１ａに嵌挿する中間栓５０と、円筒部１ａ内に注入せる溶解液６を封栓するよう円筒部１ａ内の上端側に嵌挿する液室栓５１と、ノズル部１０内に嵌挿する孔栓５２とからなる（図６）。

【０００５】この形態の薬品容器兼注射器Ａに用いる注射筒本体１は、図１に示している如く、上端が開口１１し、下端底部に注射針２装着用のニップル状のノズル部１０を備える外径１２mm（内径１０mm）程度のガラス製の円筒状体で、ノズル部１０の内部には、合成ゴム等のゴム材よりなる孔栓５２が嵌装され、また、そのノズル部１０の先端にはゴム材よりなる保護カバー２１が装着される。該注射筒本体１は、前記孔栓５２により封栓されるノズル部１０の上方の円筒部１ａに、下方から上方への順で、乾燥薬品室１３、通液バイパス（液流通用の流路）１４、中間栓部１５、溶解液室１６、液室栓部１７等が形成される。図２は、図１の注射筒本体１を通液バイパス１４の部位において切断した横断面図である。図３は、前記注射筒本体１の内部の中間栓部１５に嵌挿する中間栓５０の正面図、図４は前記注射筒本体１の液室栓部１７に嵌挿する液室栓５１の正面図で、これらに示す中間栓５０および液室栓５１は、共に合成ゴム等のゴム材により円盤状乃至円筒形状に成形してある。そして、液室栓５１は、上面側に雌ねじ５１０が形成してある。また、この中間栓５０および液室栓５１は、薬品容器兼注射器Ａの注射筒本体１を、それの内部に乾燥薬品４と溶解液６とを封入した製品の状態に製造していく過程で、それぞれ注射筒本体１内の中間栓部１５および液室栓部１７に装着され、それらにより隔てられる注射筒本体１内を気密的に遮断する。また薬品容器兼注射器Ａの注射器としての使用時においては、扱い者の操作により、気密的に注射筒本体１内を摺動する。また、プランジャー３は、この使用時に液室栓５１に連結するように取付けられる。また、両端に刃先のある両頭針の注射針２も、この使用時に、注射筒本体１の下端底部のノズル部１０に装着される。なお、ノズル部１０の内腔に嵌装する孔栓５２は、この例においては、円筒部１ａとは別体に形成したニップル状のキャップ体１０ａを、ノズル部１０の基端部１０ｂの外周に嵌着する際に、その基端部１０ｂの下端面とキャップ体１０ａの内端面との間に挟持させることで、ノズル部１０の内腔を封栓するようにしてある。

【０００６】この薬品容器兼注射器Ａの注射筒本体１の内部に、凍結乾燥した乾燥薬品４と溶解液６とを装填す

る工程は次の順で行なわれる。

【０００７】注射筒本体１は、それの底部のニップル状のノズル部１０の内腔に孔栓５２を嵌装して封栓し、そのノズル部１０の先端の外周に保護カバー５３を装着して、図１に示す状態とする。

【０００８】次に、この注射筒本体１内の底部の乾燥薬品室１３に、規定量の薬液を注入し、この状態の注射筒本体１を所定本数、試験管立て状の金属性ホルダーに直立する姿勢に支持して、凍結乾燥機の凍結乾燥室内の棚段の棚面上に配置し、凍結乾燥機の稼働により、この注射筒本体１内の薬液を凍結乾燥して乾燥した薬品４とする。

【０００９】次に、この注射筒本体１内の気圧を、凍結乾燥機の凍結乾燥室内の圧力調整または機外に別に設けておく気密室内において、中間栓５０を注射筒本体１内の中間栓部１５の位置まで押し込んだときに、乾燥薬品室１３内の圧力が大気圧になる水準に調節し、この状態で注射筒本体１の上端側の開口１１から円筒形に形成してある中間栓５０を中間栓部１５の位置まで押し込んで、乾燥薬品室１３を密封する。

【００１０】次いで、中間栓５０の上面を底面とする溶解液室１６内の気体を排除しつつ、ここに溶解液６を所定量注入し、液室栓５１を施し、溶解液室１６を密封する。

【００１１】これにより、図５にあるよう、乾燥した薬品４が乾燥薬品室１３内に封入され、これの溶解液６が溶解液室１６に封入された薬品容器兼注射器Ａの注射筒本体１の製品としての製造工程が終了する。

【００１２】このように製造された注射筒本体１の使用時の操作は、次の操作手順に従って行なう。

【００１３】まず、液室栓５１の上面にプランジャー３の下端側を連結する。液室栓５１の頭部には、通常雌ねじが加工されており、この雌ねじに、先端に雄ねじのあるプランジャー３の先端を図６の如く連結して、そのプランジャー３を押し下げる。

【００１４】これにより、下降する液室栓５１と溶解液６に押されて、中間栓５０も一緒に下降する。そして、その下降する中間栓５０が図７の如く、通液バイパス１４の位置に達すると、この通液バイパス１４の上下の長さＬ１が、中間栓５０の上下の厚さＤ１より長いため、中間栓５０は図７にあるよう、通液バイパス１４の上下の中間位置に停止し、溶解液室１６内の溶解液６が、中間栓５０の円筒面に外接する通液バイパス１４をへて乾燥薬品室１３へ漏入し、乾燥薬品室１３内の乾燥薬品４を溶解していく。

【００１５】次に、さらにプランジャー３を押し下げることで、溶解液６が完全に乾燥薬品室１３に送られると、中間栓５０の上面が液室栓５１の下面に密着することで、この中間栓５０は、下降する液室栓５１と一緒に再び下降し始め、その中間栓５０の下面が通液バイパス

１４の下端を通過し、図８の如く、溶解液６により乾燥薬品４が溶解した薬液Ｍを乾燥薬品室１３内に封じ込めた状態とする。これらの操作は、注射筒本体１を、ノズル部１０が下端に位置する直立した姿勢として行なうので、通液バイパス１４には乾燥薬品室１３内の気体の一部が封じ込められるだけで、溶解した薬液Ｍの全量が中間栓５０の下面と孔栓５２の間に封入される。

【００１６】次に、通液バイパス１４が中間栓５０で乾燥薬品室１３から遮断された後、ノズル部１０に装着してある保護カバー５３を外し、このノズル部１０に注射針２を装着する。この注射針２の装着で円盤状のゴム製の孔栓５２は注射針２の基端側の刃先で破られ、乾燥薬品室１３がこの注射針２の内腔を介して外部に連通してプランジャー３の押し込みにより薬液Ｍが注射針２の先端から吐出する薬品容器兼注射器Ａの状態となる。

【００１７】次に、この薬品容器兼注射器Ａを装着した注射針２が上方に位置する状態に持ち変え、その状態でプランジャー３を押し込むことで、乾燥薬品室１３内の気体を注射針２の針先から外部に排除する（図９）。この気体の排除が完全に行なわれたのち、注射針２を患者の所定部に刺し、プランジャー３の押し込みで、液室栓５１と中間栓５０とを押し下げると、ピストン頭部面として機能する中間栓５０の前面が、注射筒本体１の下端面に圧着するまで薬液Ｍは体内に注射される。

【００１８】この従来技術の注射筒本体１内に乾燥薬品４と溶解液６とを封入する製造工程において、薬液の凍結乾燥後、注射筒本体１の上端の開口部１１から中間栓５０を中間栓部１５の位置まで押し込んで、乾燥薬品室１３を密封する工程…は、凍結乾燥された薬品４を外界、即ち、汚染、吸湿、酸化等から隔離密封する工程であって、温度変化による変質を嫌うために密封後の最終滅菌ができない凍結乾燥注射剤の最重要工程の一つであるが、従来技術においては、次の何れかの方法が採用されてきた。

【００１９】（その１）図１０に示す通り、薬液注入済の注射筒本体１の所定本数を試験管立て状の金属製のホルダー７０に直立支持して、凍結乾燥機の凍結乾燥室内の棚段の棚面上に配置する際、そのホルダー７０の構造により決定される各注射筒本体１…の配列位置の真上の正確な位置で、各注射筒本体１の上端側の開口１１から上方に離した位置に、各中間栓５０…と、その中間栓５０…を押し込む押し捧７１をホルダー７０に支持しておいて、凍結乾燥機の稼働により凍結乾燥を行なう（図中の小矢印が水蒸気の流路）。凍結乾燥が終了後に、凍結乾燥機の真空状態の凍結乾燥室に、無菌乾燥窒素ガスを所定圧まで導入して、凍結乾燥機に具備されている棚段上下駆動装置により、各棚段の上下の棚間隔を縮小し、各棚の裏面（下面）で前記ホルダー７０に支持せる押し捧７１を介して、中間栓５０を注射筒本体１の上端の開口部１１に嵌挿して封栓する。その後、凍結乾燥機の各

棚間隔を開き、凍結乾燥室から、乾燥薬品４の封入を終えた注射筒本体１…をホルダー７０と共に搬出する。中間栓５０を注射筒本体１内の中間栓部１５の位置まで押し込む工程は、前述した溶解液６を注入する工程と共に、凍結乾燥機の機外の別装置で行なうこともあり、また、凍結乾燥機内で中間栓部１５の位置まで押し込むこともある。

【００２０】（その２）注入した薬液の凍結乾燥の工程を終えた注射筒本体１を、開口状態で凍結乾燥室から搬出し、別装置の無菌乾燥空気（窒素）調圧設備下の打栓器の直下に、該注射筒本体１…を順次送り、この注射筒本体１の内部を無菌乾燥空気（窒素）で所定圧に調整しつつ中間栓５０を打栓し、次いで、この中間栓５０を所定位置まで押し込み、前述した溶解液６を注入し液室栓５１を打栓する工程に接続する。

【００２１】

【発明が解決しようとする課題】前述の従来技術中、この発明が解決しようとする問題点は、注射筒本体１内に乾燥薬品４と溶解液６とを封入する製造工程における乾燥薬品４の中間栓５０による密封工程の困難性である。

【００２２】前述した従来技術のその１の手段は、凍結乾燥を終了した際、真空状態の凍結乾燥室に、無菌濾過した高度に清浄な乾燥窒素ガスを所定の圧力まで導入して封栓するもので、高度に清浄、低湿、また酸素を遮断した密封が可能である。しかし、現行のバイアルで行なっている凍結乾燥に比べて、著しく低効率、高コストとなる。

【００２３】なぜなら、バイアルの封栓の場合は、図１１の通り、バイアル９の上部の開口９０を封栓するゴム栓９１は栓下部９１０の切欠き部９１１の一部を通気孔９ａとして残して、各バイアル９の開口９０に半ば挿入されて（半打栓とよばれる）、凍結乾燥機の凍結乾燥室の棚上に配置されているので、バイアル９の開口９０とゴム栓９１の正確な位置決めを必要とせず、密集状態に半打栓としたバイアル９…を棚上に配置し、乾燥終了後に、棚段上下駆動装置により、棚間隔を圧縮するだけで、ゴム栓９１が半打栓状態から、全打栓され完全な封栓が遂行できる。しかし、薬品容器兼注射器Ａの注射筒本体１の場合には乾燥薬品４を密封する機能をもつ中間栓５０が、注射筒本体１を注射筒として機能させる際に、ピストン頭部の役割をもつため、薬液を残りなく押し出せるようそれの下面は平面であることを要し、この中間栓５０の下部に通気孔のための切欠きを設けることができず、このため、注射筒本体１の上端の開口１１に、半打栓状態にセットできない制約がある。１回分数千本から数万本もの注射筒本体１の開口１１から上方に離して、それら開口１１…の真上に、同数の中間栓５０…と押し捧７１…を正しく配置支持するためには、複雑なホルダー７０を必要とする。しかも、そのホルダー７０に注射筒本体１、中間栓５０、及び押し捧７１をセットする際に、複雑な無菌工程を遂行せざるをえないだけでなく、このためには、注射筒本体１…を密集状態で棚上に配置できず、凍結乾燥室への収容本数は、密集状態の約６０％に減少してくる。このことから著しく高コストとなるので、従前にあっては、前述したその２の手段がより多く採用されている。

【００２４】この、その２の従来技術によれば、中間栓５０の挿入は、注入した薬液の凍結乾燥を終えた注射筒本体１…を、凍結乾燥機の凍結乾燥室から搬出した後に、別装置の固定した１台の中間栓打栓機の所定位置に向け、コンベアラインにより順次送り込んで、その所定位置に順次セットして、中間栓５０を打栓し、次の作業の溶解液６の注入装置に送り出す工程となる。従って、注入した薬液の凍結乾燥を終えた注射筒本体１を、開口状態のまま、凍結乾燥機の外部へ搬出することになり、凍結乾燥機内で行なう場合と同水準の高度な密封、汚染防止、吸湿防止、酸化防止を行なうことが困難である。

【００２５】また、注射筒本体１内に乾燥薬品４と溶解液６とを封入した製品としての長期間の製品流通中に、乾燥薬品室１３内の圧力と外気圧との差圧により中間栓５０が上または下に移動し、溶解液６が注射筒本体１の外に、あるいは乾燥薬品室１３に、漏洩する事故を防止するため、中間栓５０の打栓装置には、注射筒本体１内部の空気（窒素）圧を、流通期間の気温も考慮して正確な水準に制御しつつ、コンベアラインから連続供給される注射筒本体１に中間栓５０を打栓する機能を備えなければならない。酸素排除、窒素置換、除湿、無菌無塵、気圧の精密制御の、最高度の機能を本来所有する凍結乾燥機内を利用せず、これらの諸機能を中間栓５０打栓装置にも装備することが、製造コスト上の難点ともなってくる。

【００２６】

【目的】本発明は、従来手段に生じている上述の問題を解消するためになされたものであって、薬品容器兼注射器Ａにおいて、それの注射筒本体１内に乾燥薬品４を封栓する中間栓５０を、注射器としての使用の際に薬液を射出させるピストン頭部としての機能を損なわずに、注射筒本体１内に注入した薬液を乾燥薬品４に凍結乾燥させる間、注射筒本体１の上端の開口１１に半打栓状態として装着しておけるようにする新たな手段を提供することを目的とする。

【００２７】

【課題を解決するための手段】そして、本発明は、上述の目的を達成するための手段として、円筒部の下端底部に注射針の装着用のノズル部を設け、そのノズル部にはゴム材よりなる孔栓を装着し、その孔栓より上方の円筒部に、下方から上方への順で、乾燥薬品を収容さす乾燥薬品室と、筒壁の一部を拡径した通液バイパスと、中間栓を嵌挿する中間栓部と、溶解液を収容さす溶解液室と、液室栓を嵌挿する液室栓部と、を形成した薬品容器

兼注射器の注射筒本体において、円筒部の筒壁の上端側の部位に、筒壁の一部に穿孔した通気孔を、１個ないし数個設け、かつ、その通気孔の下端から、円筒部の上端の開口の口縁までの上下距離を、中間栓の上下の厚さより短く設定することを特徴とする薬品容器兼注射器における注射筒本体を提起するものである。

【００２８】

【作用】かくすれば、中間栓５０はそれの下面を平面にしておいて、薬液の凍結乾燥の工程の間、半打栓の状態として、注射筒本体１の上端の開口１１に装着しておけ、凍結乾燥を終えたときに、凍結乾燥機の凍結乾燥室内において、その室内を無菌乾燥窒素ガスで所定圧に調整後、棚段間隔を圧縮するだけで、全打栓状態に封栓できるようになり、凍結乾燥機が具備する機能と制御機能を利用して、低コストで薬品容器兼注射器の注射筒本体に、乾燥薬品４を封入していけるようになる。

【００２９】

【実施例】次に実施例を図面に従い詳述する。なお、図面符号は、従前手段のものと同効の構成部材については同一の符号を用いるものとする。

【００３０】図１４は、本発明を実施せる薬品容器兼注射器Ａの注射筒本体１の縦断正面図、図１５は同側面図で、両図において、１ａは円筒部、１０はその円筒部１ａの下端底部に形設した注射針２装着用のニップル状のノズル部、１１は円筒部１ａの上端の開口を示し、それのニップル状のノズル部１０には、それの内腔に、合成ゴム等のゴム材よりなる孔栓５２が嵌挿され、また円筒部１ａには、下方から上方への順序で、乾燥薬品４を収容さす乾燥薬品室１３と、筒壁の一部を拡径した通液バイパス１４と、中間栓５０が嵌挿される中間栓部１５と、溶解液６を収容さす溶解液室１６と、液室栓５１を嵌挿する液室栓部１７とが形成してあり、これらについては、従前手段のものと変わりがない。

【００３１】しかし、円筒部１ａには、それの筒壁の上端側の部位に、筒壁の一部を穿孔することで形成される通気孔８が１個ないし数個周方向に並列するように形設してある。

【００３２】そして、この通気孔８は図１４に示している如く、開口１１に近い位置において、筒壁を貫通し外部に通じており、通気孔８の上端から開口１１の上縁までの距離Ｈ１は前記中間栓５０の上下厚さＤ１の半ば前後に形成し、また、通気孔８の下端から開口１１の上縁までの距離Ｈ２が、図１４にあるように、中間栓部１５に嵌挿される中間栓５０の上下厚さＤ１より短く形成してある。通気孔８の直径は、前記中間栓５０の上下厚さＤ１の約５０％未満で足り、実際には、１０ないし１２mm程度である薬品容器兼注射筒の内径の１０％程度未満で足りる。なお、この通気孔８は、この実施例では、図１４・図１５にあるように、周方向に１８０度の位相差を設けて配位した２個になっているが、３個ないし４個とするなど、その数は任意に選択して良い。また、通気孔８を複数個設ける場合には、それらの通気孔８は、円筒部１ａの周壁の同じ高さ位置に揃えて形設する。また、この通気孔８の孔面積は、その合計が４mm^2 程度になるように設定してよい。

【００３３】このように、円筒部１ａの上端部に通気孔８を設けた注射筒本体１は、それの内部の乾燥薬品室１３内に、凍結乾燥させる薬液を規定量注ぎ込んで、ホルダー７０に直立した姿勢に保持せしめて、凍結乾燥機の凍結乾燥室内の棚段の上面に載架し、凍結乾燥機の稼働により凍結乾燥を行なうとき、中間栓５０を、前記図１４の如く、それの上半側が円筒部１ａの上端の開口１１の口縁から上方に突出して、下端面が通気孔８の上端付近に位置する状態に嵌挿することで、この中間栓５０により半打栓の状態に保持されるようになる。

【００３４】このとき、中間栓５０は、およそ下半部が円筒部１ａ内に嵌挿されているから、しっかりと、この半打栓とした位置に保持される。

【００３５】そして、凍結乾燥の工程中に、薬液から除去される水蒸気は、図１４で細線の矢印に示している如く、通気孔８を介して注射筒本体１の外部に排出される。公知のとおり、通常のバイアル内凍結乾燥においては、バイアル９の底面積が注射筒本体１の底面積の４乃至６倍の場合でも、半打栓の状態に嵌挿したゴム栓９１の栓下部９１０の切欠部９１１により形成される通気路９ａは（巾４mm×高２．５mm）１０mm^2 ×２個が一般的であり、乾燥過程の水蒸気流量は、およそ底面積（即ち薬品充填面積）に比例するから、通気孔８の長さが筒壁の厚さ約１mmに過ぎないことを考慮すれば、通常条件では、合計４mm^2 程度の通気断面積があれば、通気孔８の断面積の狭さが乾燥を妨げることはない。通常条件では、直径２mm程度の通気孔８は２個、または直径２．５mm程度の通気孔８は１個で足りる。

【００３６】凍結乾燥の工程が終了すると、真空状態にある凍結乾燥室内に無菌濾過乾燥窒素ガスが所定圧まで導入され、その後、凍結乾燥機に装備されている棚段上下駆動装置の作動で、全棚段の上下の間隔が、半打栓状態にある中間栓５０の上面を円筒部１ａの上端の開口１１の上端面に揃う位置に押し込むまで圧縮されてくる。これにより、中間栓５０の下端側の周面は、図１６にあるように、通気孔８の下端を下方に越して円筒部１ａの筒壁の内面に隙間なく密接して、凍結乾燥した乾燥薬品４を密封する状態となる。即ち、半打栓の状態にある中間栓５０を、何等の補助具を用いることなく、凍結乾燥室内の棚段の上下の間隔を圧縮することで棚段の裏面側により全打栓の位置に押し込めるようになる。

【００３７】このとき、全打栓の前に凍結乾燥室に導入される窒素ガスの圧力は、中間栓５０が図１４の鎖線に示している如く、所定位置である中間栓部１５にまで押し込まれたときに乾燥薬品室１３内の気圧を大気圧とす

9

る水準に正確に制御されるので、図１６の如く全打栓の状態位置に押し込まれた中間栓５０は、円筒部１ａの筒長さａと乾燥薬品室１３の筒長さｂとの比から、乾燥薬品室１３内の気圧がｂ／ａ気圧となることで、この気圧と大気圧との差圧により、図１６にて鎖線に示している如く、乾燥薬品室１３側に引き込まれていき、それにより差圧が減じてくることで、差圧と摩擦抵抗とがバランスした位置に停止する（所定位置より約１０mm以上高い位置となる）。

【００３８】次に図１７は、前述の凍結乾燥の工程を終えて、中間栓５０により全打栓とした注射筒本体１に対し溶解液６を封入する工程の説明図である。

【００３９】上述の凍結乾燥の工程を終えた注射筒本体１は、凍結乾燥機の機内から、無菌清浄層流空気吹き出し設備の下で、別装置に移される。そこで、まず、図１７にて示す如く、中間栓５０を所定の中間栓部１５の位置より距離ｈだけ高い位置にまで押し込み、この中間栓５０の上面に、規定量の溶解液６を注ぎ込む。このとき、溶解液６の液面は、通気孔８の下端レベル、ないし、それより僅か（例えば1mm程度以内）下のレベルとなる。前述の高さｈは、規定量の溶解液６を注ぎ込むことで、それの液面が通気孔８の下端のレベルか、その僅か下に合致するように設定されている。

【００４０】これに続いて、液室栓５１を円筒部１ａの上端の開口１１に嵌挿していく。このとき、溶解液６の液面の上方において注射筒本体１の内部に存在している空気は、下降する液室栓５１の下面により押されて図１７にて細線の矢印に示す如く、通気孔８を介して自然に注射筒本体１の外部に排除されて、液室栓５１の下面が図１８の如く溶解液６の液面に密着していくか、僅かな空気を残すのみとなるので、従来手段の如く、この空気を強制的に排除しながら液室栓５１を嵌挿していくための装置および操作を不要とする。

【００４１】そして、この操作の後に、液室栓５１を、前述の高さｈ分だけ押し込む。これにより、溶解液６および中間栓５０は、この高さｈだけ下降して、中間栓５０が所定の位置を占めるようになる。また、液室栓５１は、それの下面が通気孔８の下端のレベルから前述の高さｈ分だけ深く注射筒本体１内に押し込まれることで、図１９に示している如く、下半側の全周面が円筒部１ａの筒壁の内周面に密接する状態となって、溶解液６の封栓を確実なものとし、乾燥薬品４および溶解液６を所定の状態に封入した薬品容器兼注射器Ａの注射筒本体１の製造が完了する。

【００４２】この注射筒本体１を注射器として使用する際の操作および手順は、従前手段と同様であり、操作者が従来法を超える追加的負担や注意義務を強いられることはない。

【００４３】

【発明の効果】以上説明したように、本発明によれば、

10

注射筒本体１内に注入した薬液を凍結乾燥するために、その注射筒本体１を凍結乾燥機の凍結乾燥室内に搬入する前に、中間栓５０を注射器として使用するときのピストンとしての機能を損なわすことなく、注射筒本体１の上端の開口１１に乾燥水蒸気の流出路を残した半打栓の状態に密着でき、その注射筒本体１を凍結乾燥室内の棚段の上面に密集状態に配列しても、凍結乾燥機内で乾燥後、通常の凍結乾燥機に従来から備わる棚段上下駆動装置により棚段の上下の間隔を圧縮するだけで、いかなる補助具もなしに、半打栓の状態の中間栓５０を全打栓（内部を密封するまで栓を押し込む）の位置に押し込んで、乾燥薬品４を密封できるようになる。これにより、従来技術における凍結乾燥機内での密封に必要な複雑なホルダーの使用、あるいは従来技術の凍結乾燥機外部での密封に必要な、無菌無塵窒素置換・窒素置換・正確な減圧調整・設備が不要になる。さらに、溶解液６注入後の液室栓５１の打栓過程における溶解液６の液面上の空気排除の特別設備も不要にし得る。

【図面の簡単な説明】

【図１】従前の薬品容器兼注射器における注射筒本体の一部破断した正面図である。

【図２】同上のII－II線における横断平面図である。

【図３】同上の中間栓の正面図である。

【図４】同上の液室栓の正面図である。

【図５】同上の乾燥薬品および溶解液を封入した状態の一部破断した正面図である。

【図６】同上の注射筒本体を注射器として使用するときの操作手順の説明図である。

【図７】同上の注射筒本体の溶解液室内の溶解液を乾燥薬品室内の乾燥薬品に注ぎ込む工程の説明図である。

【図８】同上の注射筒本体の溶解液の注ぎ込みの工程を終えた状態の説明図である。

【図９】同上の注射筒本体の注射器として使用する前の注射筒本体内の空気を追い出す工程の説明図である。

【図１０】従前の薬品容器兼注射器の注射筒本体内に注入した薬品を凍結乾燥させる際の、中間栓の保持状態の説明図である。

【図１１】従前のバイアルを用いて薬品を凍結乾燥させる際の、バイアルの開口に嵌挿しておくゴム栓の半打栓の状態を示す説明図である。

【図１２】同上のゴム栓の正面図である。

【図１３】同上のゴム栓の底面図である。

【図１４】本発明を実施せる薬品容器兼注射器の注射筒本体の一部破断した正面図である。

【図１５】同上の注射筒本体の一部破断した側面図である。

【図１６】同上注射筒本体の凍結乾燥工程の終了後に中間栓を全打栓とした状態の縦断正面図である。

【図１７】同上注射筒本体の、中間栓の全打栓後にさらに溶解液を注入して液室栓を封栓していく工程の説明図

11　　12

である。

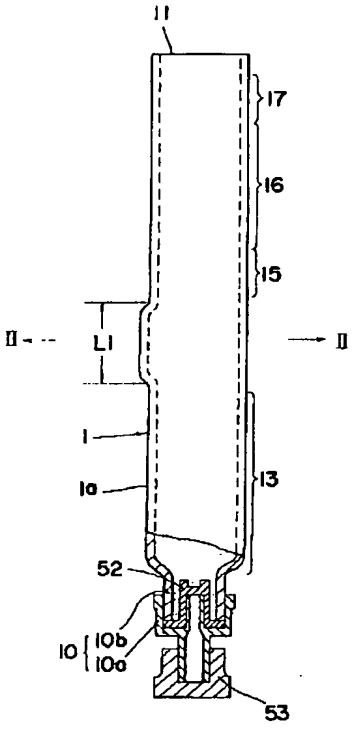
【図１８】同上の注射筒本体の、液室栓を溶解液の液面まで押し込んだ状態の説明図である。

【図１９】同上の注射筒本体の、液室栓を封栓した状態の縦断正面図である。

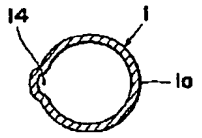
【符号の説明】

Ａ…薬品容器兼注射器、１…注射筒本体、１ａ…円筒部、１０…ノズル部、１０ａ…キャップ体、１０ｂ…基端部、１１…開口、１３…乾燥薬品室、１４…通液バイパス、１５…中間栓部、１６…溶解液室、１７…液室栓部、２…注射針、３…プランジャー、４…乾燥薬品、５０…中間栓、５０ａ…縮径部、５０ｂ…栓上部、５０ｃ…栓下部、５１…液室栓、５１ａ…縮径部、５１０…雌ねじ、５２…孔栓、５３…保護カバー、６…溶解液、７０…金属製のホルダー、７１…押し棒、８…通気孔、９…バイアル、９ａ…通気孔、９０…開口、９１…ゴム栓、９１０…栓下部、９１１…切欠部、Ｍ…薬液、Ｗ…巾、Ｌ…長さ、Ｄ…厚さ。

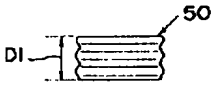
【図１】



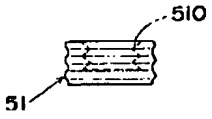
【図２】



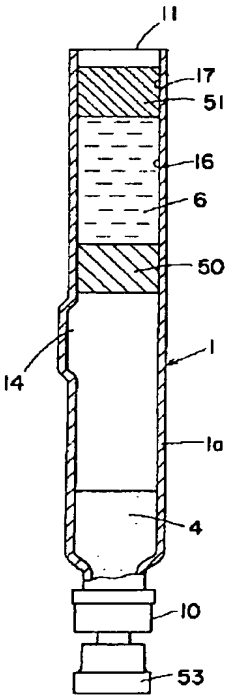
【図３】



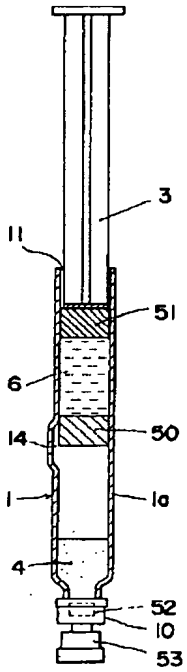
【図４】



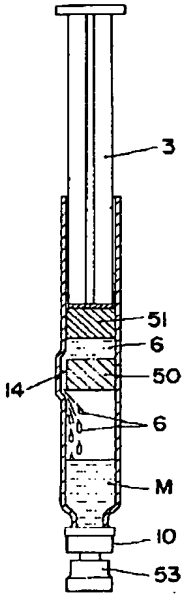
【図５】



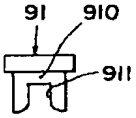
【図６】



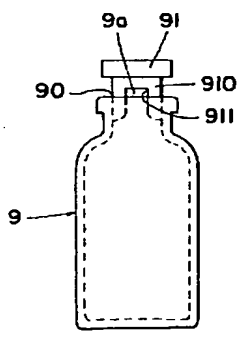
【図７】

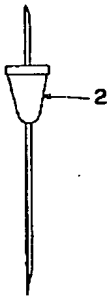


【図１２】

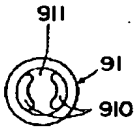


【図１１】

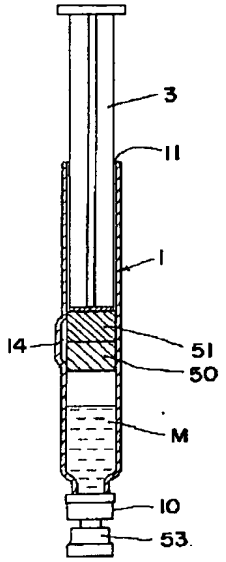




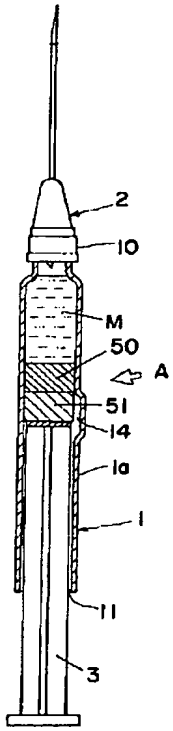
【図１３】



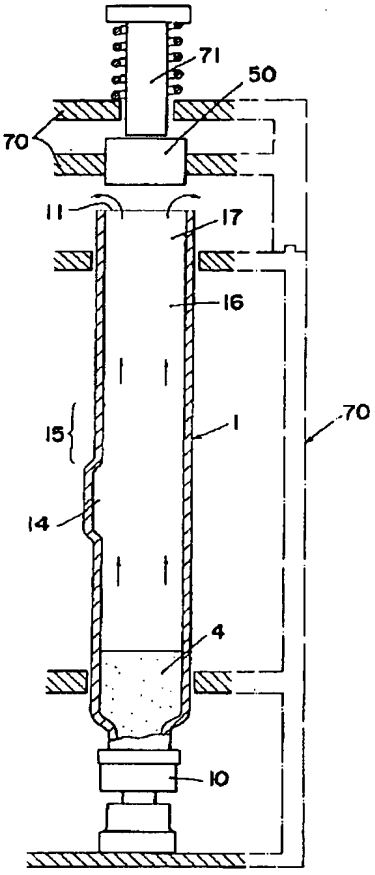
【図8】



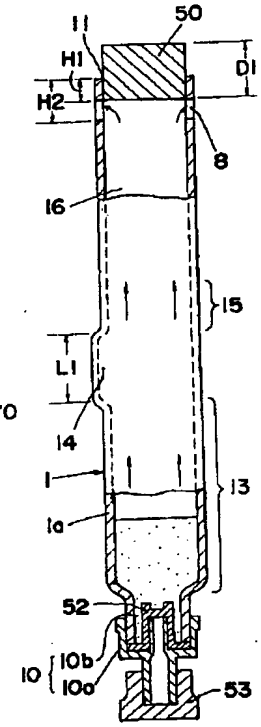
【図9】



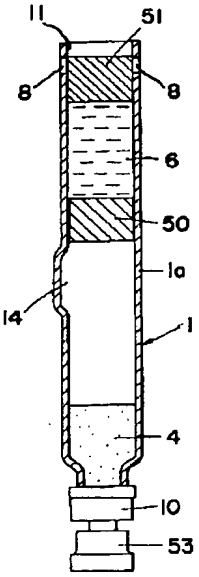
【図10】



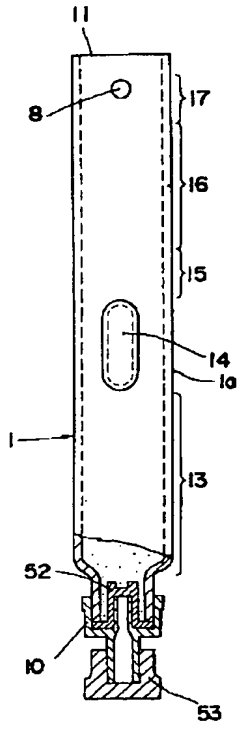
【図14】



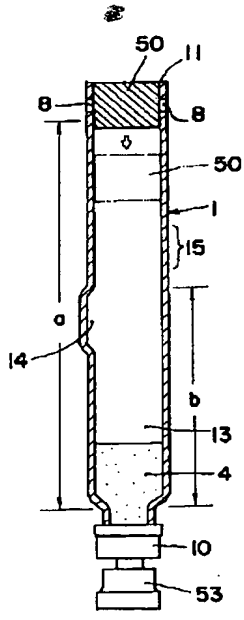
【図19】



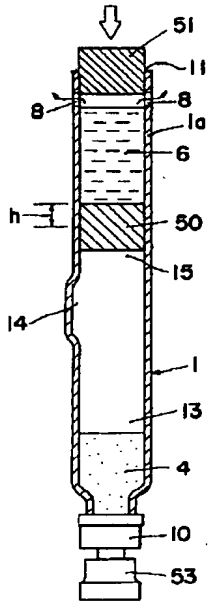
【図15】



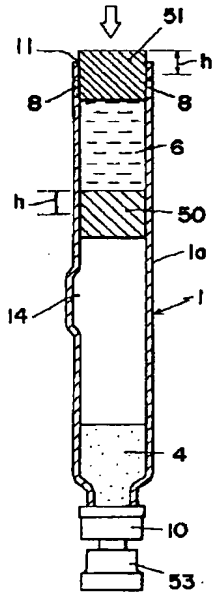
【図16】



【図17】



【図18】



JAP-7&0064 AN

JP7080064

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention among the medicine container combination injectors which the injection made the gestalt beforehand enclosed in the main part of a glass syringe of an injector, It separates into the drugs which freeze-dried the injection enclosed in the main part of a glass syringe, and the solution in which this is dissolved, and is related with the improvement about the main part of a glass syringe in the medicine container combination injector of the gestalt which is made to dissolve drugs with a solution inside the main part of a glass syringe, and is used as a parenteral solution in the case of the operation of injection.
[0002]Restoration seal is carried out at a medicine cell (an ampul or a vial) at the time of manufacture, it ships and circulates, at the time of use, the method of an injection which injects this into a patient's etc. body from a glass syringe is [after attracting a drug solution from a medicine container to a glass syringe] traditional, and its today is also common. However, the medicine container and injector which loads beforehand the inside of the main part of a glass syringe of an injector with the injection began to be used under the name of the pre fill syringe (pre-filled syringe) etc. in recent years. It is for preventing the misuse, the operation mistake and product tampering contamination accompanying a move of the drug solution from a medicine container to the main part of a glass syringe of an injector, and damage to the hypodermic needle edge of a blade, and saving the time and effort and time which attract high viscosity thru/or a thixotropy drug solution to a glass syringe to an urgent emergency case.
[0003]the business which is unstable if liquefied, is freeze-dried within a medicine appliance at the time of manufacture, and is circulating by solution attachment of another container with this dry medicine container -- the time -- the progress of bionics with rapid dissolution freeze-drying injections -- as a drug for cancer treatment etc. -- importance -- much more -- rising -- **** -- although -- the time of use -- the procedure is much more more complicated than liquefied injections. That is, a solution is ejected from the main part of a glass syringe in a dry medicine container after drawing in in the main part of a glass syringe of an injector from a solution container, dry medicine is dissolved, and the drug solution after the dissolution must be re-attracted in the main part of a glass syringe concerned, and must be injected into the inside of the body. this business -- the time -- a dissolution injection -- the spread of medicine container and injectors is expected just from a case. This invention improves the medicine container and injector for freeze-drying injections, and aims at that spread.
[0004]
[Description of the Prior Art]The medicine container and injector A for the conventional freeze-drying injections. The main part 1 of a glass syringe which formed the nozzle part 10 of the shape of a nipple for hypodermic needle wearing in the lower end pars basilaris ossis occipitalis of the body 1a, The hypodermic needle 2 of the double ended needle with which the nozzle part 10 of that is equipped, and the plunger 3 fitted in from the opening 11 of the upper bed of the main part 1 of a glass syringe, It consists of the middle plug 50 fitted in the body 1a so that the sealing plug of the insertion **** dry medicine 4 may be carried out into the body 1a of the main

part 1 of a glass syringe, the fluid chamber plug 51 fitted in the upper bed side in the body 1a so that the sealing plug of the pouring **** solution 6 may be carried out into the body 1a, and **** 52 fitted in into the nozzle part 10 (drawing 6).
[0005]The main part 1 of a glass syringe used for the medicine container and injector A of this gestalt, As shown in drawing 1 an upper bed by the glass cylindrical bodies about opening 11 the outer diameter of 12 mm (10 mm in inside diameter) which carries out and equips a lower end pars basilaris ossis occipitalis with the nozzle part 10 of the shape of a nipple for hypodermic needle 2 wearing. The inside of the nozzle part 10 is equipped with the protective cover 21 which **** 52 which consists of rubber materials, such as a synthetic rubber, is fitted in, and becomes at the tip of the nozzle part 10 from a rubber material. It is the order to the upper part [lower part], and the dry medicine room 13, the dipping bypass (channel of liquid flow popular use) 14, the middle plug part 15, the solution room 16, and fluid chamber plug part 17 grade are formed in the upper body 1a of the nozzle part 10 to which the sealing plug of this main part 1 of a glass syringe is carried out with the aforementioned hole plug 52. Drawing 2 is the cross-sectional view which cut the main part 1 of a glass syringe of drawing 1 in the part of the dipping bypass 14. Both the middle plugs 50 and fluid chamber plugs 51 that the front view of the middle plug 50 which fits drawing 3 in the middle plug part 15 inside said main part 1 of a glass syringe, and drawing 4 are the front views of the fluid chamber plug 51 fitted in the fluid chamber plug part 17 of said main part 1 of a glass syringe, and are shown in these are fabricated to discoid thru/or cylindrical shape with rubber materials, such as a synthetic rubber. And the fluid chamber plug 51 has formed the female screw 510 in the upper surface side. This middle plug 50 and the fluid chamber plug 51 are the processes in which the main part 1 of a glass syringe of the medicine container and injector A is manufactured in the state of the product which enclosed the dry medicine 4 and the solution 6 with the inside of it, The middle plug part 15 and the fluid chamber plug part 17 in the main part 1 of a glass syringe are equipped, respectively, and the inside of the main part 1 of a glass syringe separated by them is intercepted in airtight. It slides on the inside of the main part 1 of a glass syringe in airtight by a treatment person's operation at the time of the use as an injector of the medicine container and injector A. The plunger 3 is attached so that it may connect with the fluid chamber plug 51 at the time of this use. The nozzle part 10 of the lower end pars basilaris ossis occipitalis of the main part 1 of a glass syringe is equipped also with the hypodermic needle 2 of the double ended needle which has the edge of a blade in both ends at the time of this use. **** 52 fitted in the lumen of the nozzle part 10, In this example, when attaching in the periphery of the base end 10b of the nozzle part 10 the cap body 10a of the shape of a nipple formed in the different body, it has been made to carry out the sealing plug of the lumen of the nozzle part 10 in the body 1a by making it pinch between the lower end surface of that base end 10b, and the inner end surface of the cap body 10a.
[0006]The process of loading the inside of the main part 1 of a glass syringe of this medicine container and injector A with the freeze-dried dry medicine 4 and the solution 6 is performed in order of the following.
[0007]The main part 1 of a glass syringe fits in and carries out the sealing plug of **** 52 to the lumen of the nozzle part 10 of the shape of a nipple of the pars basilaris ossis occipitalis of that, equips the periphery at the tip of the nozzle part 10 with the protective cover 53, and changes it into the state which shows in drawing 1.
[0008]Next, pour the drug solution of a stipulated amount into the dry medicine room 13 of the pars basilaris ossis occipitalis in this main part 1 of a glass syringe, and the

quantity of the dissolved drug solution M is enclosed between the undersurface of the middle plug 50, and **** 52.

[0016]Next, after the dipping bypass 14 is intercepted from the dry medicine room 13 with the middle plug 50, the protective cover 53 with which the nozzle part 10 is equipped is removed, and this nozzle part 10 is equipped with the hypodermic needle 2. Disc-like **** 52 made of rubber is broken by wearing of this hypodermic needle 2 by the edge of a blade by the side of the end face of the hypodermic needle 2, and it will be in the state of the medicine container and injector A which the dry medicine room 13 opens for free passage outside via the lumen of this hypodermic needle 2 and in which the drug solution M carries out the regurgitation from the tip of the hypodermic needle 2 by pushing of the plunger 3.

[0017]Next, the hypodermic needle 2 equipped with this medicine container and injector A has in the state where it is located up, it changes, and the gas in the dry medicine room 13 is eliminated outside from the needle tip of the hypodermic needle 2 by pushing in the plunger 3 in that state (drawing 9). If a patient's prescribed part is stabbed with the hypodermic needle 2 and the fluid chamber plug 51 and the middle plug 50 are depressed by pushing of the plunger 3 after exclusion of this gas is performed thoroughly, the drug solution M will be injected into the inside of the body until the front face of the middle plug 50 which functions as a piston head side is stuck to the lower end surface of the main part 1 of a glass syringe by pressure.

[0018]In the manufacturing process which encloses the dry medicine 4 and the solution 6 in the main part 1 of a glass syringe of this conventional technology, the middle plug 50 is pushed in to the position of the middle plug part 15 after freeze-drying of a drug solution from the opening 11 of the upper bed of the main part 1 of a glass syringe, Although process -- which seals the dry medicine room 13 is the process of carrying out isolation seal of the freeze-dried medicine 4 from the external world, i.e., contamination, moisture absorption, oxidation, etc. and it is one of the primary importance processes of the freeze-drying injections which cannot perform the last sterilization after sealing in order to dislike deterioration by a temperature change, Which following method has been adopted in conventional technology.

[0019](The 1) Erection support of the prescribed number of the main part [finishing / chemical feeding] 1 of a glass syringe is carried out at the metal test-tube-stand-like electrode holders 70 as shown in drawing 10, When arranging on the shelf surface of the plate of the freeze-drying interior of a room of a freeze dryer, in the exact position right above an arranged position of each main part of glass syringe 1 -- determined by the structure of the electrode holder 70. each middle plug 50 -- and its middle plug 50-- are stuffed into the position separated from the opening 11 by the side of the upper bed of each main part 1 of a glass syringe to the upper part -- it pushes, ** 71 is supported in the electrode holder 70, and it freeze-dries by operation of a freeze dryer (the small arrow in a figure is a channel of a steam). With the plate slide drive device which introduces sterile dry nitrogen gas into the freeze-drying room of the vacua of a freeze dryer to predetermined pressure, and is provided in the freeze dryer after completing freeze-drying. The shelf spacing of the upper and lower sides of each plate is reduced, with the rear face (undersurface) of each shelf, via support ********** 71, the middle plug 50 is fitted in the opening 11 of the upper bed of the main part 1 of a glass syringe, and a sealing plug is carried out to said electrode holder 70. Then, each shelf spacing of a freeze dryer is opened and main part of glass syringe 1 -- which finished enclosure of the dry medicine 4 is taken out with the electrode holder 70 from a freeze-drying room. Since another device of a freeze dryer outside the plane performs the process of pushing in the middle plug 50 to the position of the middle

main part 1 of a glass syringe of this state is supported into the posture which stands straight in the metallic electrode holder of a prescribed number and the shape of a test tube stand, It arranges on the shelf surface of the plate of the freeze-drying interior of a room of a freeze dryer, and is considered as the medicine 4 which freeze-dried the drug solution in this main part 1 of a glass syringe, and was dried by operation of a freeze dryer.

[0009]Next, in the airtight interior of a room which provides independently the atmospheric pressure in this main part 1 of a glass syringe in the pressure regulation of the freeze-drying interior of a room of a freeze dryer, or outside the plane, When the middle plug 50 is pushed in to the position of the middle plug part 15 in the main part 1 of a glass syringe, The pressure in the dry medicine room 13 adjusts to the level which becomes atmospheric pressure, pushes in the middle plug 50 currently formed in the cylindrical shape in this state from the opening 11 by the side of the upper bed of the main part 1 of a glass syringe to the position of the middle plug part 15, and seals the dry medicine room 13.

[0010]Subsequently, eliminating the gas in the solution room 16 which uses the upper surface of the middle plug 50 as the bottom, specified quantity pouring of the solution 6 is carried out here, the fluid chamber plug 51 is given, and the solution room 16 is sealed.

[0011]Thereby, as shown in drawing 5, the manufacturing process as a product of the main part 1 of a glass syringe of the medicine container and injector A in which the dry medicine 4 was enclosed in the dry medicine room 13, and the solution 6 of this was enclosed with the solution room 16 is completed.

[0012]Operation at the time of use of the main part 1 of a glass syringe manufactured in this way is performed according to the following operating procedure.

[0013]First, the lower end side of the plunger 3 is connected with the upper surface of the fluid chamber plug 51. The female screw is usually processed on the head of the fluid chamber plug 51.

The tip of the plunger 3 which has a male screw at a tip is connected with this female screw like drawing 6, and that plunger 3 is depressed.

[0014]It is pushed on the descending fluid chamber plug 51 and the solution 6 by this, and the middle plug 50 also descends together. When that descending middle plug 50 reaches the position of the dipping bypass 14 like drawing 7, and since the length L1 of the upper and lower sides of this dipping bypass 14 is longer than the thickness D1 of the upper and lower sides of the middle plug 50, As shown in drawing 7, the middle plug 50 stops to the mid-position of the upper and lower sides of the dipping bypass 14, and the solution 6 in the solution room 16 carries out ** ON to the dry medicine room 13 through the dipping bypass 14 circumscribed to the cylinder side of the middle plug 50, and it dissolves the dry medicine 4 in the dry medicine room 13.

[0015]Next, when the solution 6 is thoroughly sent to the dry medicine room 13 by depressing the plunger 3 further, because the upper surface of the middle plug 50 sticks to the undersurface of the fluid chamber plug 51 this middle plug 50, It begins to descend again together with the descending fluid chamber plug 51, the undersurface of the middle plug 50 passes through the lower end of the dipping bypass 14, and it changes into the state where the drug solution M which the dry medicine 4 dissolved with the solution 6 was confined in the dry medicine room 13, like drawing 8. Since these operations perform the main part 1 of a glass syringe as an upright posture to which the nozzle part 10 is located in a lower end, a part of gas in the dry medicine room 13 is only confined by the dipping bypass 14, and the whole

a freeze-drying room decreases to about 60% of crowding. Since it becomes a high cost from this remarkably, if it is in old, more the means of 2 mentioned above is adopted.

[0024]According to this conventional technology of that of 2, insertion of the middle plug 50, After taking out main part of glass syringe 1 -- which finished freeze-drying of the poured-in drug solution from the freeze-drying room of a freeze dryer, it is sent in one by one by a conveyer line towards the prescribed position of one set of the middle plug capping machine which another device fixed, It sets to the prescribed position one by one, the middle plug 50 is capped, and it becomes a process sent out to the pouring device of the solution 6 of the next work. Therefore, it is difficult to perform advanced seal equivalent to the case where the main part 1 of a glass syringe which finished freeze-drying of the poured-in drug solution will be taken out to the exterior of a freeze dryer, and is performed within a freeze dryer with an opening state, a pollution control, prevention from moisture absorption, and antioxidizing.

[0025]During the prolonged product circulation as a product which enclosed the dry medicine 4 and the solution 6 in the main part 1 of a glass syringe, In order that the middle plug 50 may move to a top or the bottom by the differential pressure of the pressure in the dry medicine room 13, and outdoor air pressure and the solution 6 may prevent the accident revealed to the dry medicine room 13 out of the main part 1 of a glass syringe, The capping device of the middle plug 50 must be equipped with the function which caps with the middle plug 50 the main part 1 of a glass syringe by which continuous supply is carried out from a conveyer line, also controlling the atmospheric temperature of time of circulation to the exact level in consideration of the air (nitrogen) pressure of main part of glass syringe 1 inside. The inside of the freeze dryer which originally owns the maximum function of the close control of oxygen exclusion, a nitrogen purge, dehumidification, sterile dustlessness, and atmospheric pressure is not used, but it also becomes a difficulty on a manufacturing cost to also equip a middle plug 50 capping device with many of these functions.

[0026]

[Objects of the Invention]This invention was made in order to solve the above-mentioned problem conventionally produced for the means, and it is ****. The purpose the middle plug 50 which carries out the sealing plug of the dry medicine 4 into the main part 1 of a glass syringe of that in ******** A, While making the dry medicine 4 freeze-dry the drug solution poured in into the main part 1 of a glass syringe, without spoiling the function as a piston head to make a drug solution eject in the case of the use as an injector, it is providing the new means with which equip the opening 11 of the upper bed of the main part 1 of a glass syringe as a half-capping state, and it enables it to set.

[0027]

[Means for Solving the Problem]And as a means for attaining the above-mentioned purpose, this invention provides a nozzle part for wearing of a hypodermic needle in a lower end pars basilaris ossis occipitalis of a body, equips the nozzle part with **** which consists of rubber materials, and is the order to the upper part [body / of the upper part / **** / the / lower part], In a main part of a glass syringe of a medicine container and injector in which a dipping bypass which expanded the diameter of an accommodation **** dry medicine room and a part of barrel wall for dry medicine, a middle plug part which fits in a middle plug, and a fluid chamber plug part which fits in an accommodation **** solution room and a fluid chamber plug for a solution were formed, One piece cannot be found in a part by the side of an upper bed of a

plug part 15 in the main part 1 of a glass syringe, with the process of pouring in the solution 6 mentioned above, it may be pushed in to the position of the middle plug part 15 within a freeze dryer.
[0020](The 2) The main part 1 of a glass syringe which finished the process of freeze-drying of the poured-in drug solution, By an opening state, from a freeze-drying room, take out and directly under the capping machine under sterile dry air (nitrogen) pressure regulation equipment of another device, This main part of glass syringe 1 -- is sent one by one, and the middle plug 50 is capped, and it ranks second, adjusting the inside of this main part 1 of a glass syringe to predetermined pressure by sterile dry air (nitrogen), and connects with the process of pouring in the solution 6 which pushed in and mentioned this middle plug 50 above to the prescribed position, and capping the fluid chamber plug 51.
[0021]
[Problem(s) to be Solved by the Invention]The problem which this invention tends to solve is the difficulty of a seal process with the middle plug 50 of the dry medicine 4 in the manufacturing process which encloses the dry medicine 4 and the solution 6 in the main part 1 of a glass syringe among the above-mentioned conventional technology.
[0022]When the means of 1 of the conventional technology mentioned above ends freeze-drying, the seal which introduces and carries out the sealing plug of the pure dry nitrogen gas to a predetermined pressure highly, and intercepted [which carried out sterile filtration] clarification, damp, and oxygen highly in the freeze-drying room of the vacua is possible for it. However, compared with freeze-drying currently performed with the present vial, it becomes low efficiency and a high cost remarkably.
[0023]Because, the rubber stopper 91 with which the sealing plug of the opening 90 of the upper part of the vial 9 is carried out as drawing 11 in the case of the sealing plug of a vial leaves a part of notch 911 of the plug lower part 910 as the vent 9a, Since it is halfway inserted in the opening 90 of each vial 9 (called half-capping) and is arranged at shelving of the freeze-drying room of a freeze dryer, The opening 90 of the vial 9 and exact positioning of the rubber stopper 91 are not needed, but vial 9 -- made into crowding with half-capping is arranged on shelving, only by compressing shelf spacing with a plate slide drive device after the end of dry, the rubber stopper 91 is all capped from a half-capping state, and a perfect sealing plug can be carried out. However, since the middle plug 50 which has a function which seals the dry medicine 4 in the case of the main part 1 of a glass syringe of the medicine container and injector A has a role of a piston head when it operates the main part 1 of a glass syringe as a glass syringe, It cannot require that the undersurface from which it swerves so that it may remain and a drug solution can be extruded that there is nothing is a flat surface, and the notch for a vent cannot be provided in the lower part of this middle plug 50, but, for this reason, the opening 11 of the upper bed of the main part 1 of a glass syringe has the restrictions which cannot be set to a half-capping state. It separates from 1000 draft numbers from the opening 11 of tens of thousands of main parts 1 of a glass syringe to the upper part, and in order [of these opening 11 --] to push with middle plug 50 -- of the same number and to carry out arrangement support of ** 71 -- correctly right above, the complicated electrode holder 70 is needed. And it not only cannot but carry out a complicated sterile process, but [the main part 1 of a glass syringe, the middle plug 50 and when pushing and setting / that electrode holder 70 / ** 71,] for the purpose, it cannot arrange main part of glass syringe 1 -- on shelving by crowding, but the accommodation number to

where the peripheral wall of the body 1a is the same, and it makes them. The punched surface product of this vent 8 may be set up so that that sum total may become a 4-mm^2 grade.

[0033]Thus, the main part 1 of a glass syringe which formed the vent 8 in the upper bed part of the body 1a, the drug solution freeze-dried in the dry medicine room 13 inside it -- ** -- a fixed quantity being poured in and, When you make it hold into the posture upright in the electrode holder 70, it constructs over the upper surface of the plate of the freeze-drying interior of a room of a freeze dryer and it freeze-dries by operation of a freeze dryer, It comes to be held with this middle plug 50 at the state of half-capping because the Johan side of that projects the middle plug 50 from the peristome of the opening 11 of the upper bed of the body 1a to the upper part and a lower end surface fits it in the state where it is located near the upper bed of the vent 8, like said drawing 14.

[0034]Since the lower half part is about fitted in into the body 1a at this time, the middle plug 50 is held firmly at the position considered as this half-capping.

[0035]And the steam in which freeze-drying is removed from a drug solution in process is discharged by the exterior of the main part 1 of a glass syringe via the vent 8 as drawing 14 shows to the arrow of the small-gage wire. In [publicly known passage] the usual freeze-drying in a vial, Even when the area of base of the vial 9 is 4 thru/or 6 times the area of base of the main part 1 of a glass syringe, As for the aeration way 9a formed of the notch 911 of the plug lower part 910 of the rubber stopper 91 fitted in the state of half-capping, 10(2.5 mm of 4 mm[in width] x quantities)mm^2x2 piece is common, Since the steam flow of a drying process is proportional to an area of base (namely, medicine filled face product) about, if it takes into consideration that the length of the vent 8 is only about 1 mm in thickness of a barrel wall, if there is an aeration cross-section area about a total of 4-mm^2, on conditions, the straitness of the cross-section area of the vent 8 will not usually bar desiccation. Usually, conditions are [vent 8 about 2 mm in diameter] sufficient for two pieces or the vent 8 about 2.5 mm in diameter at one piece.

[0036]After the process of freeze-drying is completed, sterile filtration dry nitrogen gas is introduced into the freeze-drying interior of a room in a vacua to predetermined pressure, and after that by the operation of the plate slide drive device with which the freeze dryer is equipped. It is compressed until the interval of the upper and lower sides of all the plates stuffs the upper surface of the middle plug 50 in a half-capping state into the position which is equal to the upper bed side of the opening 11 of the upper bed of the body 1a. Thereby, the peripheral surface by the side of the lower end of the middle plug 50 will be in the state of passing the lower end of the vent 8 caudad, and it being [that there is no crevice in the inner surface of the barrel wall of the body 1a] close, and sealing the freeze-dried dry medicine 4, as [show / in drawing 16]. That is, it comes to push in the position of all the capping by the rear-face side of a plate by compressing the interval of the upper and lower sides of the plate of the freeze-drying interior of a room, without using any auxiliary tool for the middle plug 50 in the state of half-capping.

[0037]At this time, the pressure of the nitrogen gas introduced into a freeze-drying room before all the capping, Since it is correctly controlled by the level which makes atmospheric pressure atmospheric pressure in the dry medicine room 13 when it is pushed even into the middle plug part 15 which is a prescribed position as the middle plug 50 shows the broken chain line of drawing 14, The middle plug 50 stuffed into the state position of all the capping like drawing 16, From the ratio of pipe length a of the body 1a, and pipe length b of the dry medicine room 13, because the atmospheric

barrel wall of a body, and a vent which punched a part of barrel wall is partly provided in it, And a main part of a glass syringe in a medicine container and injector setting up shorter than thickness of the upper and lower sides of a middle plug up-and-down distance from a lower end of the vent to peristome of an opening of an upper bed of a body is raised.

[0028]

[Function]it writes -- if it carries out, the middle plug 50 will make the undersurface of that the flat surface, and equip the opening 11 of the upper bed of the main part 1 of a glass syringe with it as a state of half-capping between the processes of freeze-drying of a drug solution, when freeze-drying is finished, In the freeze-drying interior of a room of a freeze dryer, the interior of a room only by compressing a plate interval after adjusting to predetermined pressure with sterile dry nitrogen gas, It can come change a sealing plug into all the capping states, and the dry medicine 4 can be enclosed now with the main part of a glass syringe of the medicine container and injector by low cost using the function and control facility which a freeze dryer possesses.

[0029]

[Example]Next, an example is explained in full detail according to a drawing. The same numerals shall be used for drawing numerals about the thing of an old means, and the members forming of the effect.

[0030]About this invention, drawing 14 is a vertical section front view of the main part 1 of a glass syringe of the operation **** medicine container and injector A, and drawing 15 is the side view, The nozzle part of the shape of a nipple for hypodermic needle 2 wearing which made 1a to the body and made 10 in both figures at the lower end pars basilaris ossis occipitalis of the body 1a, 11 is shown and the opening of the upper bed of the body 1a to the nozzle part 10 of the shape of a nipple of that. **** 52 which becomes a lumen of that from rubber materials, such as a synthetic rubber, is fitted in, and to the body 1a. In an order to the upper part [lower part], the dry medicine 4 The accommodation **** dry medicine room 13, The dipping bypass 14 which expanded the diameter of a part of barrel wall, the middle plug part 15 in which the middle plug 50 is fitted, and the fluid chamber plug part 17 which fits in the accommodation **** solution room 16 and the fluid chamber plug 51 for the solution 6 are formed, and there are not a thing of an old means and a change about these.

[0031]However, the vent 8 formed in the part by the side of the upper bed of the barrel wall of that in punching a part of barrel wall does not have one piece in the body 1a, and it has made so that some may be arranged in parallel in a hoop direction.

[0032]And in [as this vent 8 is shown in drawing 14] the position near the opening 11, As penetrate a barrel wall, it leads outside, and the distance H1 from the upper bed of the vent 8 to the upper limb of the opening 11 is formed before or after the middle of the up-and-down thickness D1 of said middle plug 50 and the distance H2 from the lower end of the vent 8 to the upper limb of the opening 11 is shown in drawing 14, It has formed shorter than the up-and-down thickness D1 of the middle plug 50 fitted in the middle plug part 15. Less than about 50% of the up-and-down thickness D1 of said middle plug 50 is sufficient for the diameter of the vent 8, and they have been less than about 10% of inside diameters of the medicine container and glass syringe which is 10 thru/or about 12 mm enough actually. In this example, as shown in drawing 14 and drawing 15, it is two pieces which established and configurated the phase contrast of 180 degrees in the hoop direction, but this vent 8 may choose arbitrarily that number, such as considering it as three pieces thru/or four pieces. In forming two or more vents 8, those vents 8 are arranged with the height position

injector -- disadvantage **** -- there being nothings and, Even if it can stick to the state of half-capping which left the outflow path of the dry steam to the opening 11 of the upper bed of the main part 1 of a glass syringe and arranges the main part 1 of a glass syringe on the upper surface of the plate of the freeze-drying interior of a room at crowding, Only by compressing the interval of the upper and lower sides of a plate with the plate slide drive device with which the usual freeze dryer is equipped from the former after desiccation within a freeze dryer, Nothing, any auxiliary tools are stuffed into the position of all the capping (a plug is pushed in until it seals an inside) of the middle plug 50 of the state of half-capping, and can seal the dry medicine 4 now. Thereby, a sterile dust-free nitrogen purge and a nitrogen purge, and exact decompression adjustment and equipment required for seal in use of a complicated electrode holder required for seal within the freeze dryer in conventional technology or the freeze dryer exterior of conventional technology become unnecessary. Special equipment of oil-level absentminded mind exclusion of the solution 6 in the capping process of the fluid chamber plug 51 after solution 6 pouring can also be made unnecessary.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is the front view in which the main part of a glass syringe in an old medicine container and injector carried out the partial fracture.
[Drawing 2]It is a crossing top view in an II-II line same as the above.
[Drawing 3]It is a front view of a middle plug same as the above.
[Drawing 4]It is a front view of a fluid chamber plug same as the above.
[Drawing 5]It is the front view in which the state where a dry medicine same as the above and solution were enclosed carried out the partial fracture.
[Drawing 6]It is an explanatory view of an operating procedure when using the main part of a glass syringe same as the above as an injector.
[Drawing 7]It is an explanatory view of the process of pouring the solution of the solution interior of a room of the main part of a glass syringe same as the above into the dry medicine in a dry medicine room.
[Drawing 8]It is an explanatory view in the state where the process which the solution of the main part of a glass syringe same as the above pours in was finished.
[Drawing 9]It is an explanatory view of the process of driving out the air in the main part of a glass syringe before using it as an injector of the main part of a glass syringe same as the above.
[Drawing 10]It is an explanatory view of the holding state of a middle plug at the time of freeze-drying the medicine poured in into the main part of a glass syringe of an old medicine container and injector.
[Drawing 11]It is an explanatory view showing the state of half-capping of the rubber stopper fitted in the opening of a vial at the time of freeze-drying medicine using an old vial.
[Drawing 12]It is a front view of a rubber stopper same as the above.
[Drawing 13]It is a bottom view of a rubber stopper same as the above.
[Drawing 14]It is the front view with which the main part of a glass syringe of the operation **** medicine container and injector carried out the partial fracture of this invention.
[Drawing 15]It is the side view in which the main part of a glass syringe same as the above carried out the partial fracture.

pressure in the dry medicine room 13 turns into b/a atmospheric pressure. It is drawn in the dry medicine room 13 side by the differential pressure of this atmospheric pressure and atmospheric pressure, and stops by it in the position with which differential pressure and frictional resistance balanced because differential pressure decreases by that cause, as drawing 16 shows to the broken chain line (it becomes a position higher not less than about 10 mm than a prescribed position).
[0038]Next, drawing 17 is an explanatory view of the process of enclosing the solution 6 to the main part 1 of a glass syringe which finished the process of the above-mentioned freeze-drying and was considered as all the capping with the middle plug 50.
[0039]The main part 1 of a glass syringe which finished the process of above-mentioned freeze-drying is moved from the inside of a plane of a freeze dryer to another device under sterile pure laminar flow air blow-off equipment. Then, first, as drawing 17 shows, the middle plug 50 is stuffed even into the position only whose distance h is higher than the position of the predetermined middle plug part 15, and the solution 6 of a stipulated amount is poured into the upper surface of this middle plug 50. At this time, the oil level of the solution 6 serves as a level under small (for example, less than about 1 mm) from the lower end level of the vent 8 thru/or it. By pouring in the solution 6 of a stipulated amount, the above-mentioned height h is set up so that the oil level of that may agree the level of the lower end of the vent 8, and under [its] small.
[0040]The fluid chamber plug 51 is fitted in the opening 11 of the upper bed of the body 1a following this. At this time, the air which exists in the inside of the main part 1 of a glass syringe [above the oil level of the solution 6], As it is pushed by the undersurface of the descending fluid chamber plug 51 and drawing 17 shows to the arrow of a small-gage wire, Since it is automatically eliminated by the exterior of the main part 1 of a glass syringe via the vent 8, and the undersurface of the fluid chamber plug 51 sticks to the oil level of the solution 6 like drawing 18 or it becomes leaving slight air, The device for fitting in the fluid chamber plug 51 and operation are conventionally made unnecessary like a means, eliminating this air compulsorily.
[0041]And the fluid chamber plug 51 is pushed in after this operation only for the above-mentioned height h minutes. Thereby, as for the solution 6 and the middle plug 50, only this height h descends and the middle plug 50 comes to occupy a position. The fluid chamber plug 51 is that the undersurface of that is deeply pushed in in the main part 1 of a glass syringe from the level of the lower end of the vent 8 only for the above-mentioned height h minutes, It will be in the state where the perimeter side by the side of a lower half is close to the inner skin of the barrel wall of the body 1a, the sealing plug of the solution 6 is made into a positive thing, and manufacture of the main part 1 of a glass syringe of the medicine container and injector A which enclosed the dry medicine 4 and the solution 6 with the predetermined state is completed as shown in drawing 19.
[0042]The operation at the time of using this main part 1 of a glass syringe as an injector and a procedure are the same as that of an old means, and an operator does not have forced the additional burden and duty of care exceeding a conventional method.
[0043]
[Effect of the Invention]As explained above, in order to freeze-dry the drug solution poured in into the main part 1 of a glass syringe according to this invention, the function as a piston before carrying in the main part 1 of a glass syringe to the freeze-drying interior of a room of a freeze dryer, when using the middle plug 50 as an

[Drawing 16]It is a vertical section front view in the state where the middle plug was considered as all the capping after the end of the freeze-drying process of the main part of a glass syringe same as the above.
[Drawing 17]It is an explanatory view of the process of pouring in a solution further and carrying out the sealing plug of the fluid chamber plug after all the capping of a middle plug of the main part of a glass syringe same as the above.
[Drawing 18]It is an explanatory view in the state where the fluid chamber plug of the main part of a glass syringe same as the above was pushed in to the oil level of a solution.
[Drawing 19]It is a vertical section front view in the state where the sealing plug of the fluid chamber plug of the main part of a glass syringe same as the above was carried out.
[Description of Notations]
A [-- Nozzle part,] -- A medicine container and injector, 1 -- The main part of a glass syringe, 1a -- A body, 10 10a [-- Dry medicine room,] -- A cap body, 10b -- A base end, 11 -- An opening, 13 14 [-- Fluid chamber plug part,] -- A dipping bypass, 15 -- A middle plug part, 16 -- A solution room, 17 2 [-- A middle plug, 50a / -- Diameter reduction part,] -- A hypodermic needle, 3 -- A plunger, 4 -- Dry medicine, 50 50b [-- Diameter reduction part,] -- The plug upper part, 50c -- The plug lower part, 51 -- A fluid chamber plug, 51a 510 [-- A solution, 70 / -- Metal electrode holders, 71 / -- A push rod, 8 / -- A vent, 9 / -- A vial, 9a / -- A vent, 90 / -- An opening, 91 / -- A rubber stopper, 910 / -- The plug lower part, 911 / -- A notch, M / -- A drug solution, W / -- Width, L / -- Length, D / -- Thickness.] -- A female screw, 52 -- A hole plug, 53 -- A protective cover, 6

CLAIMS

[Claim(s)]
[Claim 1]Form the nozzle part 10 for wearing of the hypodermic needle 2 in a lower end pars basilaris ossis occipitalis of the body 1a, equip the nozzle part 10 with **** 52 which consists of rubber materials, and from the **** 52 in order to the upper part [lower part] to the upper body 1a. The dipping bypass 14 which expanded the diameter of the accommodation **** dry medicine room 13 and a part of barrel wall for the dry medicine 4, In the main part 1 of a glass syringe of a medicine container and injector in which the middle plug part 15 which fits in the middle plug 50, and the fluid chamber plug part 17 which fits in the accommodation **** solution room 16 and the fluid chamber plug 51 for the solution 6 were formed, To a part by the side of an upper bed of a barrel wall of the body 1a, the vent 8 which punched a part of barrel wall, A main part of a glass syringe in a medicine container and injector providing some and setting [one piece thru/or] up shorter than the thickness D1 of the upper and lower sides of the middle plug 50 the up-and-down distance H2 from a lower end of the vent 8 to peristome of the opening 11 of an upper bed of the body 1a.